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#### 1958 BUYERS' GUIDE

Aero-elasticity under various wind directions

# How to use the 1958 Buyers' Guide

This third annual edition of the Aviation Week Buyers' Guide includes, for the first time, listings of Canadian firms serving the aircraft industry. You will find these companies listed separately in the Manufacturers' and Distributors' Indexes, but integrated alphabetically with U.S. firms in the product listings.

## SECTIONALIZED INDEXES . . .

The Guide divides its manufactured products listing into five separate sections of related interest. This is done for maximum convenience in finding any particular item or service.

## If YOU ARE BUYING . . .

Refer to the alphabetical product index which follows to find the page number of each specific product with its manufacturer. All products in this Guide are indexed by section and page number. For example: Alternators . . . C-4 . . . would be found in Section C, page 8.

## If YOU ARE SELLING . . .

You will find the names of the buyers of complete systems and components for the military services between page 22 and 33, and for the commercial airlines on page 43.

## MANUFACTURERS AND DISTRIBUTORS . . .

An alphabetical listing of manufacturers whose products are featured in this Guide begins on page 24. A similar listing of distributors serving the aircraft industry begins on page F-1.

## BEST PAGE LISTINGS . . .

Advertisers in the Guide are boldfaced in the Manufacturers' Index, the Distributors' Index and in the Product Listings, and page numbers of their advertisements are shown.

## ADVERTISING PRODUCTS . . .

An index of advertisers, with page numbers of their ads, begins on page B-28. A special index of advertisers' products beginning on page 57, will help you to obtain complete information on products quickly and easily by referring to the advertising pages.

## READER SERVICE . . .

Further information on all products advertised in the Guide is quickly available. Use the convenient postage paid card inserts, placed throughout the book, which are keyed to advertisements.

## SECTIONS OF GUIDE

**A1 AIRCRAFT:** This section lists products that are classified either complete or as major systems in six categories: Propulsion, major components, sub-complete units or units in several assemblies are in the final terms.

**B1 MILITARY:** Listings are similar to those in Section A, but less applicable specifically to military. Specified supporting equipment is also listed, but commercial support items are not included here.

**C1 AVIONICS:** The specialized equipment listings in this section include all the avionics parts—radios, transmitters, switches and connectors—plus the large lenses and antennae, fire-control systems and specialized units that extend man's knowledge and control of a weapon.

**D1 SUPPORTING EQUIPMENT:** The increasing importance of the task of support of aircraft systems is recognized by creating this new section in a category of its own, including all the hardware items, tools and other tools and equipment that go into supporting aircraft.

**E1 MAINTENANCE EQUIPMENT:** In this section are listed the hundreds of computers, small and large, that aid transportation of people or cargo, the manufacture of large fixed items like hangars and runways and lighting systems and services of repair contractors.

# Abnormalities Dictate ARDC Spending

By Everett Clark

Washington—Patterns of being for Air Force research and development in the coming year will be one of considerable change and accompanying confusion.

After a year of reducing effort, non-priority operating procedures and trying to estimate contradictory budget totals will be followed by a reversal of that trend.

Impact of Soviet technological advancements in the past year is expected to have a profound effect on the Air Force program, regardless of how many dollars are added to or subtracted from research and development funds.

USAF's research effort has undergone so many unusual changes—due to a fusion of communications, electronic technology—that many questions still the road will have been to lose a vital role in the research function.

Even if the downward trend had continued, readjustment would have taken another six months in a year to complete.

Now, however, a new set of rules is being imposed. Talk of debt limits, expenditures ceilings and appropriations has given way to demands for more and better research to meet the challenge of what man already is doing in space exploration.

**Production programs and engineering support of USAF's smaller wings continue to impose a heavy workload on research and development facilities.**

**Confidence in the work**

in the test facilities. While the cost and manpower of the test facilities continued to grow, technological advances nevertheless are overwhelming existing facilities and raising new ones

everywhere.

In the main, the bulk of these problems, a side issue of the budget, has almost caused the US Air Force, Defense Department, Congress and the public to forget the seriousness of the Russian technological threat to small combat for a moment. The situation would not be good, faced down, downplayed and now about to undergo unexpected acceleration.

Only the most diligent reading of the problem will prevent USAF from losing the effect of another set of analysis.

Rising with the costs of living in overpriced Los Alamos, USAF has undergone a series of changes involving both how budget items are spent from outside and increased internal funding of these tasks.

Research and development has felt

all of these changes, either directly or indirectly. No command in the USAF family could be expected to absorb all the punishment, so it was spread around. And even though the cuts cuts last fiscal 1957 and in fiscal 1958 were aimed at procurement and production, commands whose economic structure was altered were in areas of research and development.

After a year of reducing effort, non-priority operating procedures and trying to estimate contradictory budget totals will be followed by a reversal of that trend.

Impact of Soviet technological advancements in the past year is expected to have a profound effect on the Air Force program, regardless of how many dollars are added to or subtracted from research and development funds.

### Complex Problems

Problems ARDC faces include: • A \$60 million deficit budget. This might have allowed continuation of the previous year's work if spending ceilings had not been imposed and inflation were not a factor, but it permitted no expansion of effort. In addition, \$125 million of the total is eaten up by operations and management.

• Production programs and engineering support of USAF's smaller wings continue to impose a heavy workload on research and development facilities.

• Confidence in the work in the test facilities. While the cost and manpower of the test facilities continued to grow, technological advances nevertheless are overwhelming existing facilities and raising new ones everywhere.

In the main, the bulk of these problems, a side issue of the budget, has almost caused the US Air Force, Defense Department, Congress and the public to forget the seriousness of the Russian technological threat to small combat for a moment. The situation would not be good, faced down, downplayed and now about to undergo unexpected acceleration.

Rising with the costs of living in overpriced Los Alamos, USAF has undergone a series of changes involving both how budget items are spent from outside and increased internal funding of these tasks.

Dynamic event that began the reversal of the trend was Soviet Russia's

launching of an earth satellite (AW Oct. 4, p. 27, 30). Coming close behind Russia's claim to have a successful intercontinental ballistic missile, it focused attention on U.S. military research efforts more sharply than anyone expected.

Some effects of the new priorities of research and development forced by Soviet gains clearly have been seen. Last fiscal 1958 will be the first full budget year to reflect this new attitude.

First key to the future of USAF's research and development efforts will be Administration's presentation of the 1959 budget.

Exact same importance may be the way in which Congress acts on it. Third will be the way in which Air Force, reflecting both the same effects of downsizing and some aspects of the Soviet success, weighs in.

Patents in the past, which should not change significantly in spite of these factors, has been for Air Force to ensure approximately three-fourths of its research and development to include scientific and academic institutions through its complex of centers.

Several of these—Flight Test Center Edwards, Calif., Arnold Engineering Development Center at Tullahoma, Tenn., and Research and Technical Center at Patuxent, Md.—are research test facilities continuing to grow, technological advances nevertheless are overwhelming existing facilities and raising new ones everywhere.

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Of roughly \$700 million a year in contract dollars, about 30% of the \$4,000 contracts go to non-profit and non-governmental institutions. These represent about 20% of the total dollar value of contracts. The remainder are placed with industrial firms.

## Mid-Year Industry Upswing

By Robert Flote

The aviation industry will bounce back during 1958 from the third quarter slump of 1957 caused by pre-Sputnik defense economy policies. Gross sales will be about \$11 billion, with profit margins down slightly to a return of just over two per cent of gross sales.

Major upswing will get under way by the middle of 1958, stimulated by an estimated three to five billion dollar increase in the defense budget devoted primarily to aircraft, missiles, avionic gear and space research vehicles. First signs of this increase will be a \$1 billion supplemental appropriation for Fiscal 1958 which the President is expected to present to Congress shortly after its recesses in January. This \$1 billion is expected to be devoted primarily to the ballistic missile program and will be followed by other supplements covering manned aircraft, additional fuel and maintenance funds and air base construction.

Big impact of the new defense policy will come in the Fiscal 1959 Defense Department appropriation bill from which money will become available July 1, 1958. This bill is expected to be two to four billion dollars higher than the Fiscal 1958 \$38 billion level.

The production stretchouts and research and development cuts initiated by the Defense Department during the last half of 1957 will be reflected in a continued lower level of aviation industry sales during the first half of 1958. But the effects of these cutbacks will be more than wiped out by the upsurge in defense activity in the aircraft, missiles, avionics and space fields during the last half of 1958 and the first half of 1959.

### PRIME PROBLEMS

This reversal in defense policy is a direct result of the startling Soviet technical advances revealed during 1957 in aircraft, ballistic missiles and satellites. Most important now is developing is both military and legislative thinking is that defense budget increases must be across the board efforts aimed at solving two problems:

- \* First, bolstering our airpower is being so fast it will retain its capacity to dominate swiftly and certainly the resources of any aggressor. This

includes strengthening Strategic Air Command, the Navy's anti-submarine warfare capability and building a potent force to handle limited wars.

- \* Second, accelerate and expand our research and development effort to produce the radically new weapons required to maintain superiority five and 10 years hence.

Responsible military and congressional leaders now agree that it would be dangerous to finance new weapons development at the expense of cutbacks in currently producible weapons required to strengthen our forces in being.

Next year will be a tough year for the industry as it will have to adjust radically to new technical, political and economic factors.

The industry is beginning to find steady growing pains, both technically and financially. In the past five years, aviation technology has made more progress than during the previous 50, and this has complicated the problems of the industry.

### SIMPLY TOO COMPLEX

For example, fuels are switching from relatively simple gasoline and kerosene to liquid oxygen, boron compounds, nitric acid and uranium. Materials are changing from easily workable aluminum to stainless steel, titanium and magnesium alloys. Controls are shifting; simple systems designed for translation of man's muscular movements to movable surfaces have become the complex automatic control systems that must react many times faster and function much more precisely than the lone human capability. Even the environment of flight has moved from the Earth's envelope of atmosphere to the fringes of outer space.

Financially, most of the industry's problems stem from this galloping technology. As Donald Douglas, dean of aviation manufacturers, recently put it, "Our technology has now developed more things to do than we know how to finance." This is the heart of the major money problem facing both the manufacturing and airline segments of the aviation industry.

In the defense field, the problem involves not an actual cutback in money available but how to contain the galloping technology within budgetary limits already established.

In the transport field, it is a matter of financing jet equipment the airlines need to provide the public with this radically new form of transportation. When it is realized that some airlines are buying quantities of jet transports valued at many times the current net worth of the airline, an idea of the magnitude of this problem can be gained.

## Hinged to Defense Boosts

There will be a period of significant change in the fortunes of individual firms as the impact of these new technical and financial losses are more extensively felt. Some firms will decline, while others will set new records for sales and profits next year.

However, the industry can still look forward to roughly an \$11-billion annual market in the years just ahead. About 90% of this will still be military. It will break down to approximately seven billion dollars for Air Force hardware, \$2.5 billion for naval aviation and missiles, about a billion dollars for Army planes and missiles, and another billion in commercial sales. Of the military business, missiles will account for about 25% of the total in 1958, and sometime in the next 10 years, the figure should rise to about half the military total.

The aviation industry was the largest single manufacturing industry in the country in 1957, with a peak of 908,000 workers reached at mid-year. The new largest industry—the aerospace industry—has 795,000 workers. A drop of about 100,000 workers is expected in the aviation industry by the end of 1958—mostly production workers rather than engineering-management men.

Airlines not caught up in the sharp drop in airline history in 1957, and there are few signs that the downward trend will be arrested in 1958. Many officials are increasing net leases for the industry next year unless some form of relief is provided.

### AIRLINE PROFIT SQUEEZE

Net profits for the domestic truckline industry during 1957 are estimated at \$25 million, a 56% decrease over the \$57.7 million profit recorded in 1956. The growing profit squeeze can be attributed almost entirely to a 17% increase in operating expenses during the year compared to 1956. With labor placing heavy demands for higher wages and more fringe benefits coupled with rising fuel costs, the airlines can expect little relief from the mounting expense level in 1958.

Although operating revenue climbed 13.7% in 1957—surpassing favorably with the 13.6% increase last year—most airlines reported a reversal in the historic profit growth pattern in the last few months of 1957. It is possible that fourth quarter results represent the first evidence of a leveling-off of annual traffic increases.

As a consequence, load factors may be far off a sharp drop in 1958 since the heavy increase in available seat-miles caused by the delivery of new

equipment could quickly outpace traffic volume. Possible results will be increased competitive battles on major routes and attempts to tighten schedule patterns on routes that are not basically productive from a traffic point of view.

Although economy drives will work overall airline programs in 1958, their effects will be insignificant since increased competition will demand increased expenditures for such improvements as electronic devices for handling passengers and reservations and more modern ground handling equipment to expedite traffic flow.

In addition, the airlines will be faced with the first stages of jet transport aircraft and allied equipment investments. With the Lockheed Electra scheduled to appear on routes of Eastern Air Lines and American Airlines late in 1958 and the Boeing 707 turboprop in 1959 on Pan American's routes, the scheduled airlines will begin to make their first major transition to a new operating technique in 1958.

### AIRLINE FLYING

Indications are that in 1958 business flying industry will regain the general lost, deliveredwise, in 1957, which was primarily due to one manufacturer (Cessna) being unable to maintain the high delivery volume it developed in 1956. Caught in an overproduction squeeze, Cessna cutback early this year, pulling down the industrywide effort. Competition, in the first nine months of 1956, Cessna delivered some 2,500 business planes; in the same period of 1957, its deliveries were approximately 1,700 aircraft.

This factor was also partially responsible for industrywide total delivery value slipping from \$82 million for the first nine months of 1956 to about \$75 million in the same period this year. It is unlikely that the industry will achieve its 1956 record-breaking mark of deliveries valued at \$105 million this year.

But introduction of new models in 1958 (Beech Travel Air, Piper Comanche and Cessna 175, etc.) is expected to increase the industry's sales volumes in 1958 to at least the 1956 record figure—possibly higher.

Major problem the industry has to lick is developing a high sales volume—particularly sales of aircraft to business users. Currently the greater portion of its sales is to people already owning aircraft—in the case of see business plane makers, his first-time sales are only about 25% of his volume.

# Aircraft Industry Outlook Lacking

Washington-Dominated factors in U.S. military aircraft programs in 1958 approaches are Russian technological progress and the Federal budget.

Extensive changes in military requirements have coincided with a political determination to restrain spending and the result in recent months has been a state of non-chalance in the general area of procurement for the support of defense.

Orval H. Cook, president of the Aircraft Industries Association, and former USAF deputy chief of staff for materiel, has summed up the situation:

"Comparative values in weaponry have shifted greatly with the march of science and invention."

"Priorities have shifted. The old targets of force levels have been revised downward, and probably will go even lower."

"Things we were in a big hurry for a few months ago don't seem so important now. In the aircraft industry there have been constant cancellations, cutbacks, stretchouts, relocations, reemployment and shutdowns."

"With the program still in a state of flux and on the eve of a new Congress, sources think at no point can that be placed on the outlook for the aircraft industry."

"Activity is with us, there is no doubt, and competition has reached a new level of aggressiveness."

The aircraft industry has known all along that it would not keep up with the rate of growth in the market during 1957 or 1958 at 11,000 aircraft annually. As a matter of fact, we have been moving down year by year, over more than 9,000 in 1954, 8,000 in 1955 and 6,800 last year."

## Training Points

"We know that when target strengths would have been reached we would operate on a considerably lower plateau of production, since of maintaining those strength levels with the latest technology is questionable."

"We had expected that 1961 would be the end bearing point for the industry."

The record date is 1957, or Fiscal 1958, a financial year now only half gone.

Cook maintains, with considerable justice, that the aircraft industry itself has contributed to the current situation by reason of its successful effort to reduce costs.

In the past year, there has been an increasing amount of equipment de-boarded from schedules.

The original estimate of defense outlays for Fiscal 1958 was \$38 billion but the rate at which money was flowing a few months ago was about \$40 billion or more.

In addition to faster-than-anticipated deliveries, other factors were inflation and the increasing cost of more complex weapons systems.

Cost, as spokesman for the industry,

noted cuts forced by administration policy in the long run will do more to limit the defense effort than inflation rates.

To many, it appears clear that U.S. defense and industry policy are out of step.

As Force Secretary James H. Douglas explained the situation in several mass lectures in these terms:

"The problem we are facing is brought up in stark form at this time (at the beginning of Fiscal 1959) because of the debt ceiling, the inherent debt and the fact that Defense Department estimates of expenditures for 1957 and 1958 are substantially too low."

When the federal ledger was presented to Congress by President Eisenhower last January USAF estimated its Fiscal 1957 expenditures would run to \$36.9 billion. In September, a revised estimate placed the total at \$18.4 billion, a jump of \$9.5 billion.

Final figures for the entire Defense Department were \$33.8 billion and \$18.4 billion, up \$5.4 billion, up \$3.4 billion, up \$1.4 billion.

## Financial Forecasts

So far as USAF is concerned, and the same situation holds for the Army and Navy, there are substantial reasons why the forecast becomes brighter for Fiscal 1958 and the early months of Fiscal 1959 were in error:

• Forces are rising.

• Strategic facilities have completed weapons system programs, advanced the date of entry into service. Douglas says that until 1958 no weapons systems gain permanent status until completion of 75% of the authorized expenditures for that item in a single year. In 1956 the newer weapons took 85% of them into use. In 1957, 85% was attained and the earlier was 15%. And where programs normally take 30% in the second year, they now are achieving 45% and higher.

• Ballistic missile programs have used far more money than anticipated. In fiscal year USAF's estimated Fiscal 1957 expenditure was \$500 million. For the entire Defense Department it was \$1.5 billion. By September these figures were revised to \$1.4 billion for the Air Force and \$1.1 billion for the Defense Department.

All of the arithmetic culminated in the last Full Year Fiscal 1958 run as short half over and the continuing trend toward a fairly rate of expansion has been felt in cutbacks, cancellations and what amounts to federal legging for postponed billings.

It may well be that the relevant dollar is more important than the defense dollar in the budget, that the higher

# Essential Yardstick

By Claude Wilcox

In the desperate effort to curb开支 in the post-war era, USAF has used somewhat unusual language in explaining its plight and its program for continuation of all arms.

U. S. Air Force Secretary James H. Douglas explained the situation in several mass lectures in these terms:

"The problem we are facing is brought up in stark form at this time (at the beginning of Fiscal 1959) because of the debt ceiling, the inherent debt and the fact that Defense Department estimates of expenditures for 1957 and 1958 are substantially too low."

**Dollar Availability**

How is General Finance's measure of the degree of dollar availability to the aircraft and supporting industries:

• Showdowns, slowdowns and cancellations will be handled in time only those weapons systems which promise the most operational advantages for the Air Force.

• The Air Force is faced with the problem of getting the USAF air bases ready who will take the weapons and pay for it.

• Nuclear bombs. If one were the trigger and its components were made.

• High bay hangar facilities must be certified in view of lowered production of more missiles and fewer manned aircraft. Shelters will be eliminated and the maintenance of stand-by space will be done in a lower USAF causeway area.

• USAF will take a slow move toward modern weapons facilities unless they can be justified by a top priority project and there is no parallel alternative.

• Major repair and overhaul of second line aircraft both at depots and contractor facilities will be continued. More money will be made available for new four-line aircraft by cutting down on the work done to keep second-line models in the air.

• USAF will do what maintenance is possible at local bases, either older planes when there can't be flown without major repairs.

Along with these simple lines of economy action, there is an increasingly stern attitude toward stops, management.

See General Item.

If expenditures can ever be reduced so that the price per unit goes too high—or too low—will the program?

"The day of economy is past. Poor planning, poor structuring—of course poor management—on some old familiar faces can only be tragic."



E-104A STARFIGHTER fuselage assembly line at Lockheed's Palmdale, Calif., plant.



YANGTZE test vehicle, indicates of changing weapon system maturity.

## **Navy Procurement Tied to Budget**

Washington—Two factors—an unpreceded defense economy down, followed by Soviet technological gains—will vitally influence Navy strategy and the resulting procurement policies in the coming months.

In spite of the impetus given the country's defense effort by Soviet missile fissile and Spanish launching, economy will continue to be a watchdog, and emphasis on getting the most for the postelection dollar will be higher than ever.

Basic procurement and contracting procedures are not expected to change as the Fiscal 1959 budget proceeds through Congress. Streamlining efforts begun in the Bureau of Aeronautics' research and development contracting two years ago will continue to influence procurement and should gain in importance as reduction of costs and lead times become more essential.

Launching of Soviet satellites came at what many considered a critical time for the future of a number of aviation firms and research and development organisations.

had begun to think not only fit but,

in some cases, march in well. Navy

generally had avoided most of pitfalls

but happen at home and do not  
involve travel. Many individuals

Primary school survey

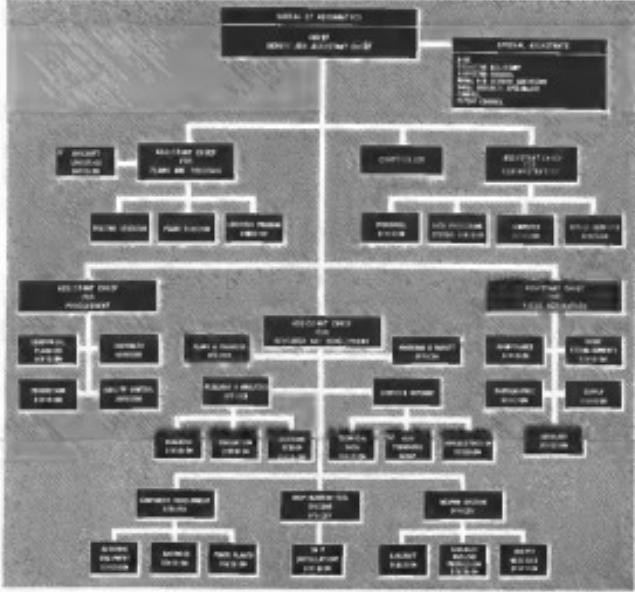
budgeted taxes tightly over the past several years, and because it had failure to increase its morale and success been increased adversely.

Nevertheless, tighter budget restrictions tended to slow developmental progress of polyphenylene and early strong aircraft, moniles, etc.

Now that Soviet assessments have added a new urgency to scientific, technological and military efforts, development and procurement of new weapons are expected to make some jumps even what normally would be the case.

All this will be done, however, with the dollar sign still a highly important factor in the formula. The Adjustment

one has made it clear, and presents



and nations must have agreed, that merely opening the oil market will not solve the country's problems.

That combination of useful, ingenious design, advanced technology and down-to-earth common sense that yields the simplest, lightest, most reliable weapon to do the job. And not one thing more."

Meeting a greater technological challenge than before with quantum weapons on cover will soon considerably greater effectiveness in employing weapons systems.

Dollars, of course, are not everything. But as investors and as managers, we must be better at operations.

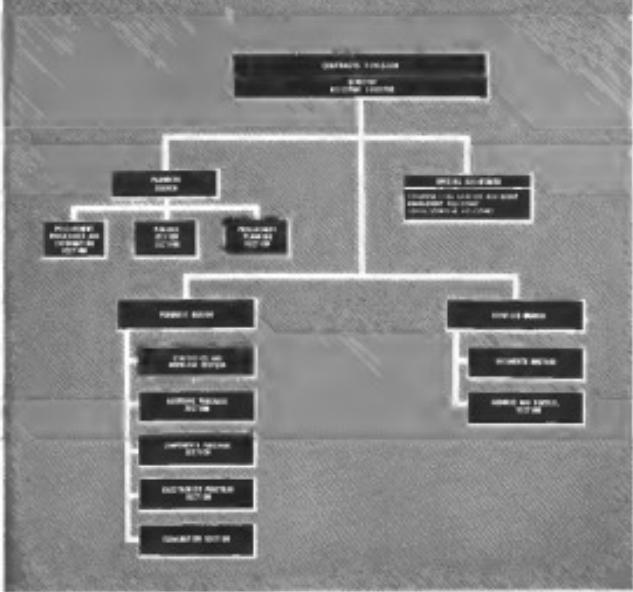
using your own resources and on your best. They see the best measure of manpower, material and effort that we

have been able to derive

"So clearly what we want at present  
is the most extensive form of the

where their value is zero. Where the values reach a

卷之三十一



# Services List Nine Contract Types Governing Buying of Military Items

One of the major responsibilities of the negotiator is to analyze the type of contract best suited to the government which he is conducting. His choice will have an important effect on the ultimate cost of the contract, as the increase given the contractor to use materials and manpower efficiently, and on the nature of the agreement which will be carried over into the performance of the contract. While early agreement between the negotiator and the contractor is desirable, the negotiator should not hurry the decision on the type of contract to be used. He should be based on a number of factors the nature of the procurement, the contractor's production and cost experience, the degree of competition present, the availability of competitive cost data, the assumption of known costs, and the extent of the control which can and should be maintained over the contractor's operations.

It is double important to avoid a premature decision, because the course of the negotiations will be considerably influenced by the type of contract contemplated for the item.

Under certain circumstances it may be desirable to obtain greater flexibility in contract negotiations by using the contractor to quote prices on more than one type. In such circumstances, if only one type of contract is considered and quoted upon it, during negotiations, the price uncertainty, a new contract will be awarded, will be difficult to eliminate by the type of contract contemplated for the item.

If it were possible to establish firm prices which were due both to the contractor and the government, the determination of the most suitable type of contract would be no problem. A Firm Fixed Price contract would be used for all procurements. But the determination of the price for more than one type is often a difficult, if not an impossible task.

For that reason, several types of contracts have been authorized for use by negotiators, as well as a number of specialized types designed to meet specific objectives.

## I-1 Firm Fixed Price Contracts

### A. Explanation

(a) Supplies or services are furnished at a specified firm price regardless of actual cost of performance.

### B. Use

(a) When sound cost estimates are possible.

(b) Commercial-type item needs strict price competing contract.

## I-2-E. Maximum Price

### A. Explanation

(a) Supplies are furnished at a maximum price which is reduced downward only after a specified percentage of the work has been completed. The final price is based on actual costs increased in point of remuneration plus estimated costs to complete.

### B. Use

(a) When sound cost estimates cannot be made at the beginning of the work, but can be made after a certain minimum percentage of the work has been completed.

(b) Relatively wide as that cost experience on first portions permits accurate projection of complete costs.

(c) Work which requires a substantial period of time to permit optimization before completion of contract.

### C. Advantages

(a) Permits fixed price contracting even when sound cost estimates are not possible at the beginning of the work.

(b) Fixed price is based on estimated cost information.

### D. Disadvantages

(a) Use and the time of implementation, contractor has little incentive to keep costs low.

(b) Because of time lag between point of remuneration and re-determination negotiations, contractor not only has later cost information than negotiations but may have completed a very large percentage of the work.

(c) Many costs not difficult to eliminate than a firm fixed price contract.

## I-2-C. Flexible Fixed Price

### A. Explanation

(a) Supplies are furnished at a flexible price which is reduced upward subject to a ceiling as downward after a specified percentage of the work has been completed. The final price is based on actual costs increased to point of remuneration plus estimated costs to complete.

(b) Intended to those items "More-or-Less Fixed Price Contracts" since difference in that price can be compensated upward.

### B. Use

(a) Contractor has less incentive than under a firm fixed price contract.

(b) More costly and difficult to administer than a firm fixed price contract.

## I-2-D. Fixed Price with Escalation

### A. Explanation

(a) Supplies are furnished at a

fixed price which is subject to revision on the occurrence of specified contingencies. Applied to increases in material prices and labor rates and set to the quality of work required.

### B. Use

(a) When increases or decreases in specific cost such as material prices or labor rates are beyond the control of the contractor.

### C. Advantages

(a) Government avoids paying for contingencies that do not occur.

(b) Permits fixed price contracting even if certain cost elements are not subject to accurate prediction.

### D. Disadvantages

(a) Government assumes part of contractor's risk.

(b) Additional administrative problems.

## I-2-I. Cost-Plus-Fixed-Fee

### A. Explanation

(a) Supplies or services are furnished at actual cost plus a fixed fee which is based on a negotiated percentage of the original estimated cost.

### B. Use

(a) Where it is impossible to estimate costs with any degree of accuracy.

(b) Research and development work.

(c) Specifications not firm.

## I-2-E. Maximum Price

### A. Advantages

(a) Government avoids paying for contingencies that do not occur.

(b) Profit not based on costs to contractor but on incentive to produce.

### B. Disadvantages

(a) Contractors have little incentive to reduce costs.

(b) May cause type of contract to administered.

## I-2-I. Cost-No-Fee

### A. Explanation

(a) Supplies or services furnished at actual cost with no fee or profit allowed.

### B. Use

(a) Where it is impossible to estimate costs with any degree of accuracy. Presently used with educational and nonprofit organizations.

## I-2-Letter Contract

### A. Explanation

(a) A written performance contract containing which authorizes the government to make payment of supplies or services, or performance of services, including, but not limited to, production planning and procurement of necessary materials.

### B. Use

(a) Where it is impossible to estimate costs with any degree of accuracy.

(b) Research and development work.

(c) Specifications not firm.

# Military Sales: Where to Go, Whom to See

## DEPARTMENT OF THE AIR FORCE

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(b) Negotiation of a defense contract in sufficient time to meet procurement need is not possible.

## II-2. Disadvantages

(a) Contractors have little incentive to reduce costs.

(b) Mass cost type of contract is undesirable.

## II-3. Use

(a) Quick contractual coverage.

(b) Competition required, when practicable.

(c) Fewer bid lettings compared to other contracts.

(d) Shorter time required for award.

(e) Awarded contracts are often terminated.

## II-4. Disadvantages

(a) Awarded contracts are often terminated.

(b) Shorter time required for award.

(c) Awarded contracts are often terminated.

(d) Awarded contracts are often terminated.

(e) Awarded contracts are often terminated.

## II-5. Letter Contract

### A. Explanation

(a) A written performance contract containing which authorizes the government to make payment of supplies or services, or performance of services, including, but not limited to, production planning and procurement of necessary materials.

(b) Intended to those items "More-or-Less Fixed Price Contracts" since difference in that price can be compensated upward.

(c) Research and development work.

(d) Specifications not firm.

(e) Shorter time required for award.

(f) Shorter time required for award.

(g) Shorter time required for award.

(h) Shorter time required for award.

(i) Shorter time required for award.

(j) Shorter time required for award.

(k) Shorter time required for award.

(l) Shorter time required for award.

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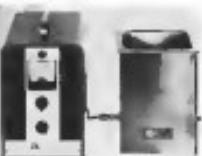
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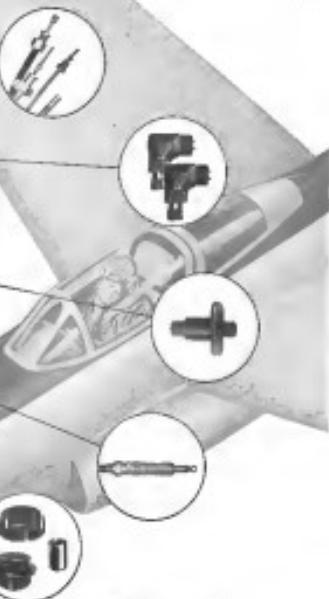
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SECTION

A

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## Selective Buying Stimulates Competition

By Irving Stone

New aircraft must bring substantial gains in performance and utility to all in a market made keenly competitive by limited purchasing power in military and civilian buyers. This basic condition demands comparable improvement in product right down the line from chief designer to parts supplier.

Despite greater selectivity by buyers because of limited purchasing power, there will be a distinct market for equipment which can pay its own way. This applies to both military and commercial fields. Outlook for the commercial market undoubtedly looks promising. Substantial military volume is indicated by the recent statement of Maj. Gen. Clarence L. Irwin: "..., manned bombers and fighter-interceptors will be vital to national defense for a long time to come.... I am convinced that the flying Air Force will be the nation's primary deterrent force for us far into the future as we can see."

In one sense, challenge of product improvement in the assumed aircraft field is more critical than in missiles. Reputable manned flight at higher and higher speeds calls for a still replacement on long life reliability. Missiles, too, demand top reliability, but the one-shot mission involves a relatively short life for components. And field of manned aircraft, as in the past, probably will continue to be a breeding place for many missile equipment refinements.

Aircraft design project heads don't hesitate to say first segments of supporting industry, with than various products, aren't always completely alert in anticipating future operational demands and should refine its introduce new products accordingly. In the second-best case, where continuous refinement is a part of the company's philosophy, it's a priority to keep up with the pace of technical progress. Those that don't frequently and development time too great to meet a critical delivery date.

One way to seize coming operational demands for equipment is to select suppliers from among project engineers or others in specialized design areas. These leads won't always be capable of translating new practical hardware on time to meet current production needs. But they can provide much needed input to the process of technical development. Their test sites can prove fruitful areas of research for subcontractors, and for equipment, component and parts suppliers, to boost the market through timely delivery of a superior product.

Military tool builders of both large and small sizes are in a strategic position to sell the aircraft industry with the advantage of being able to supply a wide range of components, equipment and parts can profit by anticipations of aircraft design requirements. The machine tool builder can gather valuable information for coming markets by keeping an informer on what new techniques of synthesis and miscellaneous metal needs like to be able to do in the shop on the next generation of aircraft.

**Manufacturing Research**

One of the big factors in meeting design requirements for future aircraft and associated items is manufacturing research. This trademark is rapidly stepping up importance to cut down valuable production time. In some customers manufacturing research will assist the difference between being able to fabricate an item to meet a rigid design requirement or not being able to meet the requirement at all. This could apply to the great deal of debat-

point out that manufacturing plants generally haven't kept up with rapid development of weapon systems, that many of the tool requirements and innovations required for the fast-changing armament picture won't yet within industry's grasp. Radical changes in tool, they say, shouldn't wait until either government-sponsored competition.

### Strengthening

Simplification is a vital characteristic that can't be pursued too energetically according to aircraft semi-bulk commercial and military. Complexity is a strength—and almost all things in there—are too difficult to maintain. Frequency result is increased downtime, less efficiency, and lower commercial output. But, assume no expense, less cost. For military applications make rugged, but simple, with lack of overall modulus. Maintenance expenses increase items that compound initial trouble with difficult remedying.

Operations are getting extra stress on demands for simplification because general trend toward complexity has caused a corresponding rise in levels of technology and skills required for maintenance jobs. Not only does this require more highly skilled technicians, it also creates difficult lead and then often difficult personnel.

Simplification, whenever possible, has been made a prime goal by designers and manufacturers of the coming models of jet transports. This went about an simplification will be carried over to succeeding models, and version of components, equipment, and parts have a large field now and ahead to extend their product application to design and manufacture.

**Aided Markets**

Growth of private and executive aircraft fields often other horrid markets where product simplification is translated into less ownership costs.

On the military side, the trend has reflected five years ago toward the importance of keeping simplicity to combat aircraft. This has been well applied all along the line in a major aircraft model, namely, the Super Sabre. Design included easier assembly, lower production, simpler maintenance, and less weight.

Any supplier of components, equipment, parts who deals with the type of design philosophy and can incorporate it, with respect to his product, you stand at the head of the race if you can accomplish, get a quick and worthy reputation in the industry.



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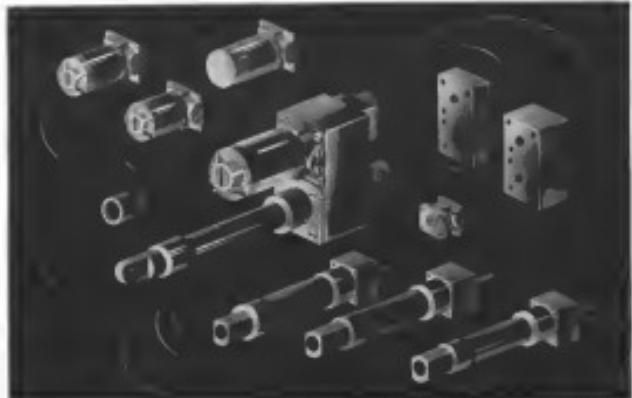


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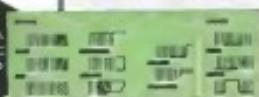
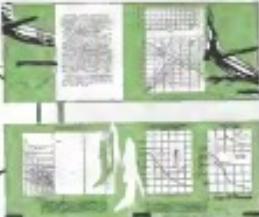
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<sup>1</sup> This literature review is part of a broader study on patient-centered care in the U.S. Air Force and will explore issues

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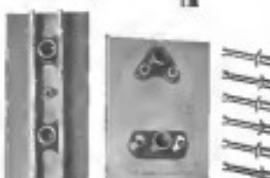
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A-48



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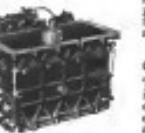
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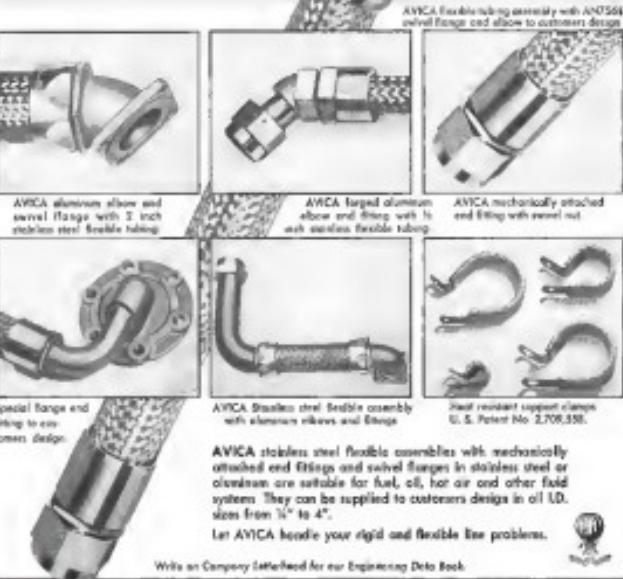
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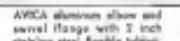
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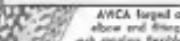
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- APPLICATIONS



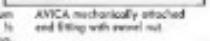
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AVICA forged aluminum elbow and fitting with 1 inch stainless steel flexible tubing



AVICA mechanically attached end fitting with metal tube



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Special flange and fitting to customer design



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Find the family resemblance in these solutions to four aircraft design problems?

## Answer:

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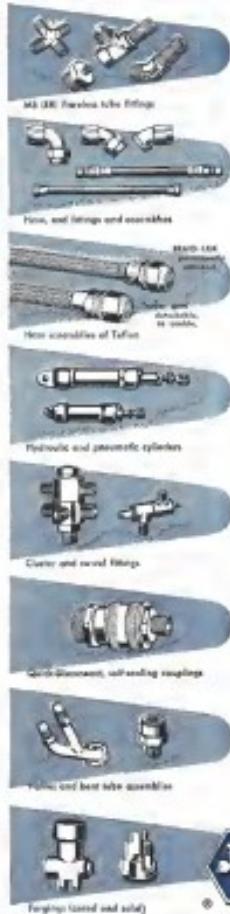
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1958 AVIATION WEEK BUYERS' GUIDE

SECTION  
**B**

# Missile Programs Keyed to Reliability

By J. S. Butz, Jr.

Directors of the government's missile programs are faced with learning "what works" rather than "what doesn't work." If they are to stay within the Administration's fiscal cutting and perhaps keep from bankrupting the economy, this statement preaches Dr. Clifford C. Farris, former Assistant Secretary of Defense, and his broad agreement among missile leaders in reorienting the future direction of government policy.

Its most important meaning for contractors is that there will be a marked reduction in the number of missile development programs. There will be fewer prime contracts to go around even though these projects will receive a growing share of the defense dollar.

Missile development has grown so complicated and costly that it is no longer possible to pursue many parallel approaches in a given weapon requirement. The decision to choose one weapon system for each combat task will have to be made almost as soon as the task arises. The enormous cost of combining several closely related projects through adolescence has been adequately explained during the recent cutbacks.

The missile separation group in the Defense Department would like to have finished its mission before it was done over with. It had consumed over \$700 million before the decision was reached that it wasn't really necessary to file the current defense directive.

## Planning Groups

The task of the government's planning and policy making groups in the Defense Department is clearly to reduce costs and technical content in an emphasis on planning and selection of cost-effective systems for the various weapons systems proposals which show promise. The percentage of time allotted these planning groups will approach zero for if their judgments prove faulty there will be no alternate routes to fall back on to meet a weapon requirement.

There will probably always be certain areas in which contractors demand an impossible or dangerous degree of a lack of technical understanding, but the factors to get maximum support that the knowledge is available to safely execute parallel weapon programs in many fields. The only significant lacking is the assignment to properly use the knowledge.

The classical military approach to seeking early decisions since conservatism is to segment more people with the problem. Long range planning has become a part of all the programs. The idea is to get everyone concerned with missile design, development, construction, procurement, supply, maintenance, etc., to give their opinions of the feasibility of the long-range plan.

One of the main problems facing such committees of classified personnel is anxiety reduction. Scores of the plans to date have been good enough to bring requests for a widening of the

tolerance, have basic requirements in addition to reliability and simplicity. One of great current importance is an immunity against environmental conditions. These range from all efforts to damage or strike the guidance system through effects steadily in the vicinity of the missile. The effectiveness of atomic electronic countermeasures has caused a large portion of our design effort to be spent protecting against them.

The growing need for reliability and simplicity of operation and maintenance is bringing about some major changes in graded missile propulsion systems. Solid propellant rocket engines are replacing liquid fuel rockets in many missile applications. This is especially true for all weapons systems which have to be reliable, yet simple, propellant. The solid fuel engine can be transported in trucked carts and then pumped onto the missile under combat conditions. The constant weakness of the solid fuel rocket cuts the pre-launch time to zero.

The level of staff necessary to operate and maintain this type of rocket is also lower when compared to the liquid fuel engine. The cost of the solid fuel engine is also below that of the liquid white smoke in quantity.

## Long-Range Missile

The last red threshold of the liquid fuel rocket is the long-range ballistic missile. These missiles require the absolute minimum in efficiency and threat survivability from their engines. Until recently liquid fuel engines answered this need, but the advances being made in the solid fuel have been sufficient to make the solid propellant long-range ballistic missile extremely feasible. Development has been mainly on the Navy's Polaris, a solid fuel ICBM, on the strength of this.

Most of a missile's development problems are concerned with some very small and seemingly minor components according to the expert. Extensive testing is done on the ground because of the difficulty of getting most of the missile to fly in the flying flight. As far as possible in this testing is it a system enough to simulate completely the whole missile in flight. It comes down to the point that we must compensate for any loss of a complete system from being ineffective.

From the troubles that have been experienced with faulty components to date it would seem that the missile that has a need for reliability would enjoy a long and profitable stay in the missile business.

select group asked to comment on long-range plans. It is felt that that type of planning is necessary to produce completely acceptable weapons systems.

Competitive outlook for the missile industry is far from rosy. The number of potential missile contractors is increasing in the last few years from under 100 to well over 100. The number of companies and equipment manufacturers is also rising rapidly.

Knowledge of the competitive or even plain of missile design and with every type of missile equipment will be vital. Reliability specifications are becoming part of the customer requirements that manufacturers must be called upon to meet. Terms defining reliability are becoming more stringent as experience grows.

Another urgent editor demand is for amplification on the operation of the missile. This is often a reason why the knowledge is often at variance with the application literature to perform elaborate maneuvering and manuvers in the face of considerations and in a wide range of environments.

The government seems these extremes complicated and unlikely situations to personnel whose average experience is slightly above the average. They are asked to prove to the customer that they can do what the customer wants with the existing equipment. This is the main problem of implementation. Problems related to spending as much to keep a permanent operating force of high average occupancy. Therefore the field is clearly fertile for my company which can meet the implementation requirements.

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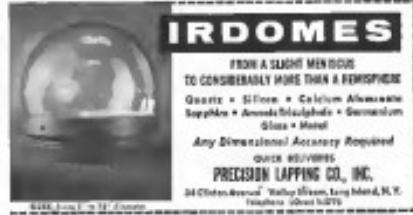
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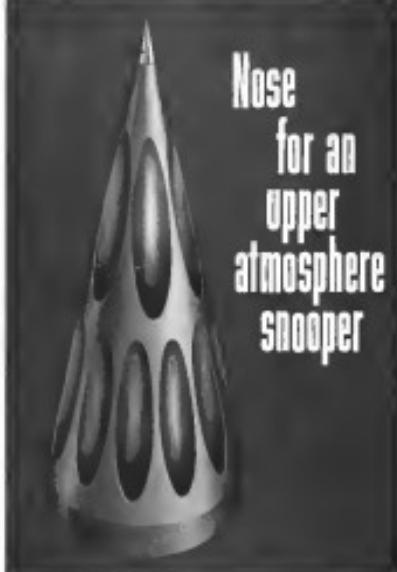
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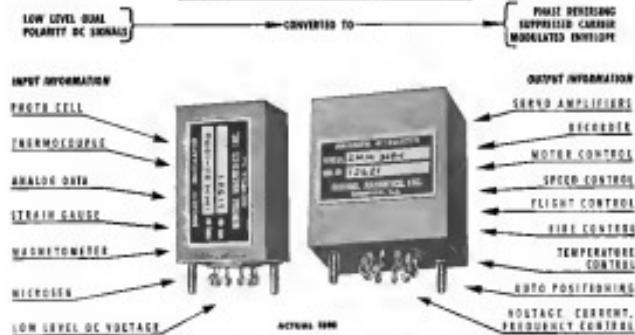
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# Big Contracts Spark Avionic Combines

By Philip J. Kline

Increasing share of the nation's defense budget will be spent for avionics in the next several years, but growing numbers of avionics manufacturers are asking: How do we go about getting our share of this increased market?

Immediately following the semi-annual Air Force briefing in June of top industry representatives at Defense AF procurement branch, avionics company officials emerged smiling, in sharp contrast to the grim looks on the faces of jet engine and aircraft officials. There appeared to be ample participation for this optimism.

Air Force officials reported that by 1980 guided missile procurement would be up about 50% over 1968 and would exceed dollars spent for aircraft. This, of course, was before Spetember I and II which have pushed up the schedule. Average of about 90% of a manufacturer's cost goes for avionics, compared to only about 25% for aircraft. Furthermore, avionics expenditures not identified with a specific aircraft or missile (like SAGE or defense systems) would reach \$1.3 billion in 1968, almost double the 1966 figure.

Extreme optimism began to fade when avionics company officials returned home and took a look at the aircraft needs vis-a-vis their current production and development. In many companies the producible mix was predictably aircraft-oriented.

Not too many companies can boast of an high a 50-75 aircraft/motoric and aircraft developments—which will determine production mix in the 1968-69 period.

Recent General Electric analysis, for example, shows that only 25% of its defense electronics development programs are specifically pointed toward missiles, although 90% of the products or techniques have missile applications.

## Contract Getting Bigger

Another interesting factor, less dramatic but equally important for the avionics manufacturer, is the trend toward larger and more complex weapons systems. Boeing GE, for example, has recently announced that another one of its defense electronics contracts had increased 489-505% during past 10 years.

Trend is significant for both industry giants and the many more medium-size firms, with overall sales of perhaps \$20-\$30 million. The major weapons system contractors naturally go to the growth.

To some medium-size firms this is a welcome change, but not all. One firm, for example, has been having to reexamine the situation in a most sobering. This is particularly true in the Defense Department economy one falls in stage weapon systems programs, such as the North American X-20.

There is obvious business advantage and pleasure, in being selected as prime contractor on a large complex weapon system. But such programs consume large chunks of the prime contractor's engineering staff and facilities. The

down side often from web specialists in complementary fields (such as solid propellants and software design). While a new software and hardware combination can apparently be developed and installed for the project, with representatives from each firm whose skills will be required. Contractual details which company will function as prime contractor for the project and who gets your proposal in at time.

• **Hughes Electronics Corp.** has started out other medium-size inventors and non-airplane companies about setting up new company which would perform systems management functions for participating avionics and airborne partners on weapons system programs.

• **Strategic Engineering Corp.**, Redwood City division of Northrop Aircraft and Electronics division of General Precision Equipment Corp., have joined hands to bid on a specific Air Force requirement.

## Condition

In some cases the government is suggesting that smaller firms from outside not bid on certain contracts. Recent contract in the Aerospace Manufacturing Board's new traffic control data processing and display system development (SAC Sept. 30, p. 29).

Other companies, like Daystrom, which have acquired a number of smaller companies during recent years, are now seeking to integrate them in order better to harness their individual talents in a bid for major systems and subsystems.

The interesting result of these forced and voluntary consolidations is that it is quickly placing medium-size companies in the position of competing with industry giants who are also notorious, or "superior," as one industry official only says.

But there are others, like Servomechanisms, for example, who believe in sticking to their subsystem specialties. Although many companies of its size have set up systems groups, Servomechanisms' emphasis is strictly "subsystem" in the sense of one of its most distinctive features that it does not seek to compete with its customers.

On the other hand, Servomechanisms does not hesitate to diversify diversified and compete with its own products. For example, company now makes its own pressure film potentiometers when it formerly purchased parts from outside suppliers. Company's research units now vacuum-expansion processes and high temperature materials for potentiometers has enabled it into the field of base components (SAC Sept. 30, p. 70).

## Size Factor

These companies are, by definition, too small to win a major weapons system prime. But they are too large to be content with "handouts" on a catch-as-can basis from the weapon system primes. This is leading to evolution or creation of medium-size firms, either in formal or informal arrangements, a trend first reported by Aviation Week (May 6, p. 69).

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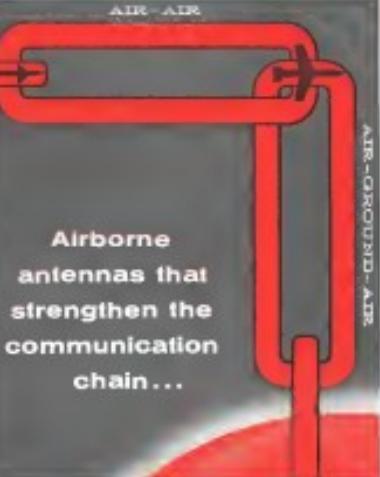
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(Continued on page 626)

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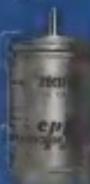
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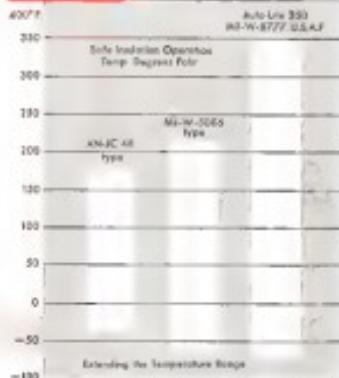
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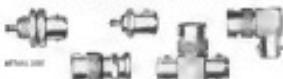
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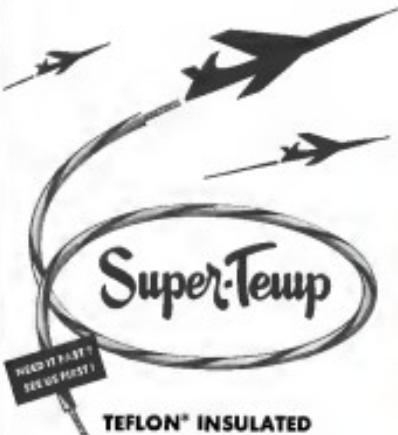
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3 This rotating test stand has two 500-hp drives which can be operated independently or can be coupled for tandem operation to produce 950 hp, using the test pad on either end. Located at North American Aviation, Columbus, Ohio.

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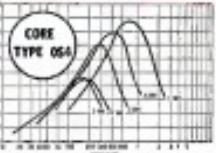
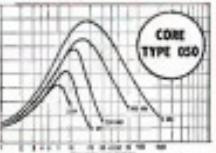
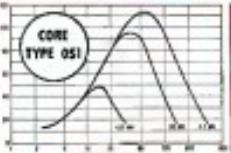
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-0.7	0.2	3.2	1.0
-0.8	0.1	3.5	0.8
-0.9	0.05	3.8	0.6
-1.0	0.02	4.0	0.5
-1.1	0.01	4.5	0.3
-1.2	0.005	5.0	0.2
-1.3	0.002	5.5	0.1
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-2.4	0.0000005	11.0	0.00002
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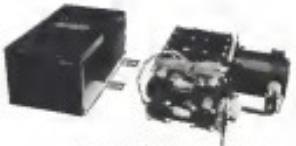
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# ANTENNAS by *canfield*

COMMUNICATIONS AND MASSIVE COMPUTING



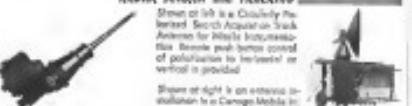
The most interesting idea discussed at the Glencoe, Illinois, symposium on log removal methods emphasized continuous feed systems.

• 第二章 资本主义的制度基础

The antenna pattern in a 1 GHz testing fixture for 300 MHz like also design and measurement considerations for many other frequencies. The off-air experience in design, development, manufacturing, field installation and service all antennas, including monopoles and reflectors, with emphasis on obtaining the best combination of microstrip, slotfed and meshfed properties in some performance specifications can lead to reliability.

#### **SEARCH AND TRAILED**

Shown at left is a Circularly Polarized Search Acquisition Beam. Antennas for missile instrumentation beams provide beam control of polarization by incident or reflected wave amplitude.



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The new M-grid 3-line Cylindrical Convergent Feed provides better E and H-plane patterns, minimum side lobe levels, and maximum gain with circular polarization with circ-polarization attachment to our single.

**7000 as Q-Band Antenna.** Ideal for installations where pointing reflections are reduced — VSWR less than 1.10 at 2.4 GHz 7000 8100 mm. Sublobes at least 34 dB down — gain is 41 dB at 7000 mm. Efficiently shaped compound elliptical reflector.



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• Including antenna of three-line operation from 10 to 15 GHz and the 10GHz

- 2000 mm — stabilized 2000-4000 mm high gain > 40 dB free space at 10 GHz, 1.5 dB at 15 GHz
- 2000 mm — maximum rotation 2000-4000 mm — the 1000 mm < 1.2 m — 250 > 37 dB
- 2000 mm — designed to reflect and transmit feeds. Harmonic feed — 1.5 dB at 10 GHz, 1.2 dB at 15 GHz — high gain > 34 dB at 10 GHz < 1.2 m required
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#### 2-SPEED SERVO DRIVEN INDICATOR

Each unit of this "compact" servo system drives a speaker transducer through a gear reduction of 4 to 1. Indicator controlled by a 1000 Hz motor operating off a 6-volt dc servomotor amplifier with a gain of 100.

Indicator amplifier is passed at 1 to 1 for slow resolution, 20 to 1 for fast resolution. Error is self-minimized (dashed).



#### servo problems stock units can't solve

This equipment "does the job right" because it was especially designed for a single application... by a company whose major function is solving individual servo control problems with complete, precisely engineered and manufactured servo assemblies.

Of course, if you just want servo components, Daystrom Transicoil can provide them to the highest order of precision and accuracy. But it is in the "package" engineering of unique assemblies that Daystrom Transicoil's experience and creative imagination offer the greatest value. And in most cases, these assemblies cost no more than the individual components would purchased separately.

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#### Record, Reduce, and Analyze Data on Magnetic Tape

##### ON-THE-SCEENE RECORDING

Getting the data on tape is generally just as difficult as the available space is limited. But standard recorders available from the Davis Laboratories Division can meet even the severe restrictions of missile flight. Recorders for airborne, mobile, and other uses characterized by limited space and severe environmental conditions range from a complete six track system in a seven rack cube illustrated, to a 30% less recorder with 14 or more tracks. Electronic Headings contain complete power facilities, while interchangeable plug-in cards provide recording circuitry for direct, TM, FFM, or digital PWM techniques on each track. Operating on 35 volts DC and/or 115 volts, 400 cps, recorders provide tape speeds from 15 to 60 ips. All include provision for electronic wav and flutter compensation provided by the Davis Laboratories Division Standard portable recording equipment is described in Bulletin 2602.

##### UNIVERSAL SYSTEMS RECORD/REPRODUCE IN THE LABORATORY

Universal Magnetic Tape Systems combine the ready-to-use trouble-free qualities of a "package" with the precision, accuracy, and flexibility of the far more expensive custom designs. Systems available provide up to thirty tracks of data capacity; interchangeable plug-in direct, FM, or PWM recording electronics for each track, electronic compensation for wav and flutter, plus numerous other features proved through years of service in jets, missiles, and on the ground. Features never before available in a "package" system include a choice of six tape speeds of the size of a switch, automatically switched components to match tape speed, and precise time coincidence of data source to the tape. Custom systems are readily available for those few applications for which a Universal System is not suited. Write for Bulletin 2701.

##### AUTOMATIC WAVE ANALYZERS SPEED DATA REDUCTION... IMPROVE STATISTICAL RELIABILITY

Feed data from magnetic tape or other steady state sources into a Davis Laboratories Division Automatic

Wave Analyzer and a complete Fourier series is automatically plotted and printed in permanent record form as either amplitude versus frequency or power versus frequency. Model 9000A analyzes frequencies from 0.5 cps to 2.5 kc, and Model 9050A has a frequency range of 3 cps to 10 kc. Both have a "quick look" facility for a fast picture of major frequency components, and both are characterized by high amplitude accuracy, wide voltage range, high resolution, and adjustable bandwidths. Multichannel inputs permit simultaneous analysis of up to six data channels. Write for Bulletin 2602.

##### MULTI-TRACK RECORD/REPRODUCE HEADS

Head styles are available from the Davis Laboratories Division to satisfy all of the major considerations of data recording, including precise data reproduction among tracks across the tape, maximum number of tracks per inch of tape width, high speed start/stop operation, special pulse system requirements, and efficiency in low speed recording. Three head stocks for data coincidences, interleaved head stocks for high track density, and "pocketed" head stocks for high speed start/stop pulse systems are constructed for maximum accuracy under the most adverse environmental conditions. Write for Bulletin 2500.

Since does not publish coverage of more than a few kinds of Davis Laboratories Division equipment for data recording, reduction, and analysis. Classes are, whatever your tape requirements, Davis Divisions is experienced in satisfying them. Tell us what they are, and we'll be happy to send you literature. Literature is available, or have a representative at your door at your convenience. If you'd like a general rundown of magnetic tape data recording, and the techniques available for getting your data accurately on tape, write for Bulletin 2651, "The Role Of Magnetic Tape In Data Recording", Minneapolis-Hanover Research Company, Davis Laboratories Division, 10721 Illinois Street, Beltsville, Maryland. Write 5-2700.

**Honeywell**

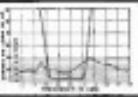
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extremely difficult sites where the installation is physically remote or where restrictions in the user's needs, resulting from space of 21.1 cu. in., one set off frequency, low and high pass filters can be accommodated with center characteristics from 1000 through 10,000 megahertz.



## MICROPHASE R.F. FILTERS FOR AIRCRAFT, MISSILES

### \* FLEXIBILITY OF DESIGN

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Meet your critical filter needs, including severe shock and high temperature requirements. These are typical examples.



**1000-100** = Directional filter to 10,000 MHz, weight 1.5 lbs., size 1.5" x 2.5" x .5". Available in 1000 MHz pass or 1000 MHz stop. Maximum insertion loss for pass band is 0.15 dB, for stop band is 0.05 dB. Also available with optional attenuators up to 100 dB.



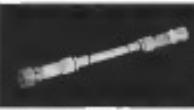
**1000-1000** = Broad-band filter or 10,000 MHz, weight 1.5 lbs., size 1.5" x 2.5" x .5". Available in 1000 MHz pass or stop. Insertion loss for pass band is 0.15 dB, for stop band is 0.05 dB. Also available with optional attenuators up to 100 dB.



**1000-10000** = Broad-band filter or 10,000 MHz, weight 1.5 lbs., size 1.5" x 2.5" x .5". Available in 1000 MHz pass or stop. Insertion loss for pass band is 0.15 dB, for stop band is 0.05 dB. Also available with optional attenuators up to 100 dB.



**1000-100000** = Broad-band filter ready type, approximately 100 dB insert loss at the 0.05-0.15 GHz + 10% level. Up to 100 dB linear frequency response. Insertion loss for pass band is 0.15 dB, for stop band is 0.05 dB.



**1000-1000000** = Attenuator for eliminating radiation pressure problems greater than 100 dB between 0.05 and 100 MHz with insertion loss less than 0.15 dB in pass band. Weight only 0.5 lb.



**1000-10000000** = Attenuator for eliminating radiation pressure problems greater than 100 dB between 0.05 and 100 MHz with insertion loss less than 0.15 dB in pass band. Weight only 0.5 lb.



**1000-100000000** = Broad-band filter with up to 100 dB insert loss at the 0.05-0.15 GHz + 10% level. Insertion loss for pass band is 0.15 dB, for stop band is 0.05 dB. Maximum insertion loss for pass band is 0.15 dB, for stop band is 0.05 dB. Also available with optional attenuators up to 100 dB.



**1000-1000000000** = Attenuating filter providing up to 100 dB insert loss at the 0.05-0.15 GHz + 10% level. Insertion loss for pass band is 0.15 dB, for stop band is 0.05 dB. Maximum insertion loss for pass band is 0.15 dB, for stop band is 0.05 dB. Also available with optional attenuators up to 100 dB.



**1000-10000000000** = Attenuating filter providing up to 100 dB insert loss at the 0.05-0.15 GHz + 10% level. Insertion loss for pass band is 0.15 dB, for stop band is 0.05 dB. Maximum insertion loss for pass band is 0.15 dB, for stop band is 0.05 dB. Also available with optional attenuators up to 100 dB.



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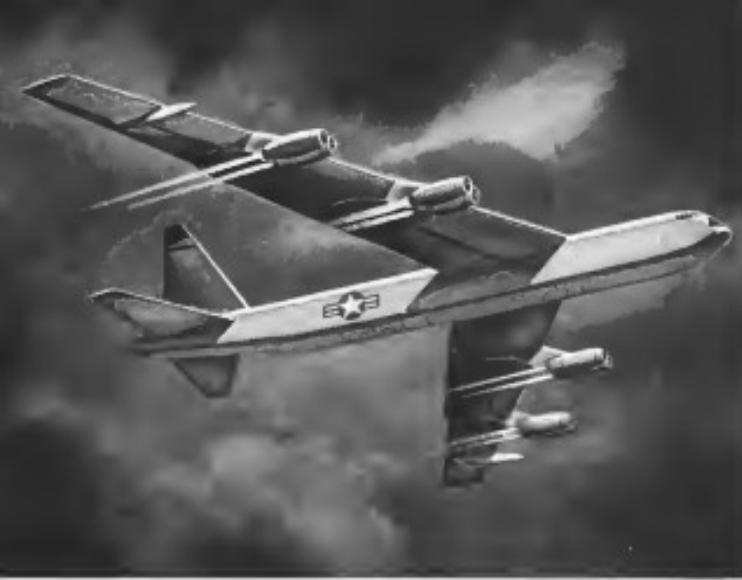


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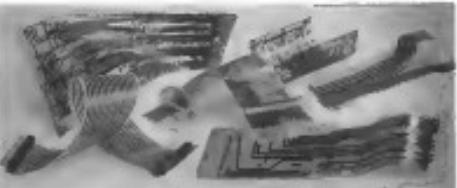




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# New Projects Hypo Support Development

By George L. Christian

With Mach 2 tracked safely under its wing, USAF is lifting its aircraft sights to Mach 4-2,720 mph. To assure the availability of aircraft equipment capable of operating at the blistering temperatures developed by such speed-up to 1,000°F on most of the airframe—Air Force has set up several projects.

## Aerospace thermal tests will:

- Republic Aviation Corp. for development of a 1,000°F hydrazine system. This model is running up with a number of engine variants capable of operating at 1,200°F ambient.
- Lockheed Aircraft Corp., Georgia Div., for design development and functional test of a pneumatic system up to 1,000°F.
- North American Aviation, Inc., Los Angeles Div., for development of an aerospace electrical power generation system capable of withstanding 6,000°F for prolonged periods of time. Program is not aimed at any specific place but is directed to the benefit of the Air Force and industry generally (AW Oct. 21, p. 59).

## 1,000°F Fluids

More elusive to very high temperature hydraulic systems—fluids which will not break down at temperatures of 1,000°F—is being overcome. Some fluids which are being considered for a sat-in 1,000°F aerospace systems are:

- **Hu-Tek Fluorocarbon Fluids**—said to be the best available. These fluids, primary disadvantages is a high melting point, about 200°F. However, if the fluid shows promise and meets breakdowns at the upper temperature limits, very may be found to lower the melting point substantially. A lot of research is being done on the entire field of others.
- Liquid metal—NaK—was first developed in the United States by 21st Century and 77% potassium. Instead of the fluid to it remains liquid at temperatures ranging from 20°F to approximately 1,000°F. Major drawback of the liquid metal is that it is highly explosive and corrosive.

Other fluids being investigated for possible use in 1,000°F hydraulic systems are called Silphateon and Tropeloy. Finding a fluid that will operate safely at 1,000°F is only half the battle.

Next problem will be to determine how to mix the final system liquid at temperatures down to -65°F. If a plausible form some sort of emulsifier will have to be studied at the low end of the temperature scale.

Very high temperature hydraulic systems will have to be metallic or plastic since it does not appear that any

in the airtight, using such techniques as the pitch test.

- Careful construction of clean hydraulic systems which are pitch tested with external hydraulic power source prior to pump installation.

• Cleaning of pump construction details by degreasing detail. If the parts fit tightly, the latter could result in metallic debris getting onto the pump's mechanism.

Although pneumatic systems are intricate power sources for many auxiliary functions aboard an airplane, no explosive payload which loads them out of very high altitude airplanes is the lack of air to be congressional at altitudes of 70,000 ft or more. At least, unique self-driven pneumatic is not practical at these altitudes.

Compressed air turbines are suitable for a one- or two-shot emergency type pneumatic operation but they can't supply air on a continuous basis. They also involve a considerable weight penalty.

## Mono-Propellants

Mono-propellants, such as propyl nitrate, may provide the means of operating a pneumatic system in an airtight atmosphere.

Research engineers think that a mono-propellant's exhaust might be used to drive a high temperature thermal system, for example.

Another infinite combination is considering how to invert automatically such fuel tanks—particularly empty ones so planes flying at 100,000 ft won't run out of fuel. A 100,000 ft altitude for combustible mixture which may be in the tank at 100,000 ft may be.

Such a potential explosive combination could exist in a plane that has been flying very fast at high altitudes, built up the heat in some of its tanks, then descended rapidly, causing air to rush into the tank.

High speed of the plane may heat heated the fuel tank's propellant components—such as valves—to the point where they would ignite the heat sufficiently to ignite the fuel's mixture in the tank.

Stokes are under way to come up with a means of meeting the tank—probably with nitrogen—before such a dangerous situation occurs with explosive.

The problem is to prevent the meeting automatically and to have it meeting last only during the diagnosis period to avoid the weight and space penalty of carrying enough nitrogen to cover the tank for the long periods of time when it is positioned enough fuel to be perfectly safe.

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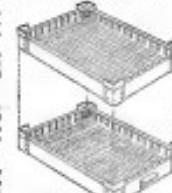


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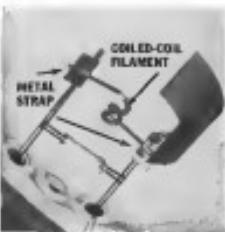


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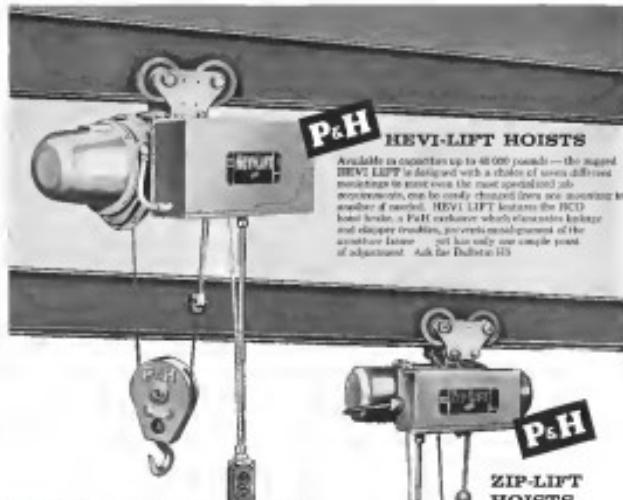
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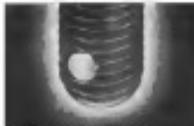
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the nut and loosening the threads of  
the bolt.



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42 FW  
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plate. They are self-locking nuts with  
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ER 3B-6**

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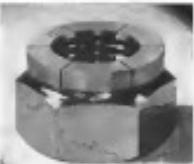
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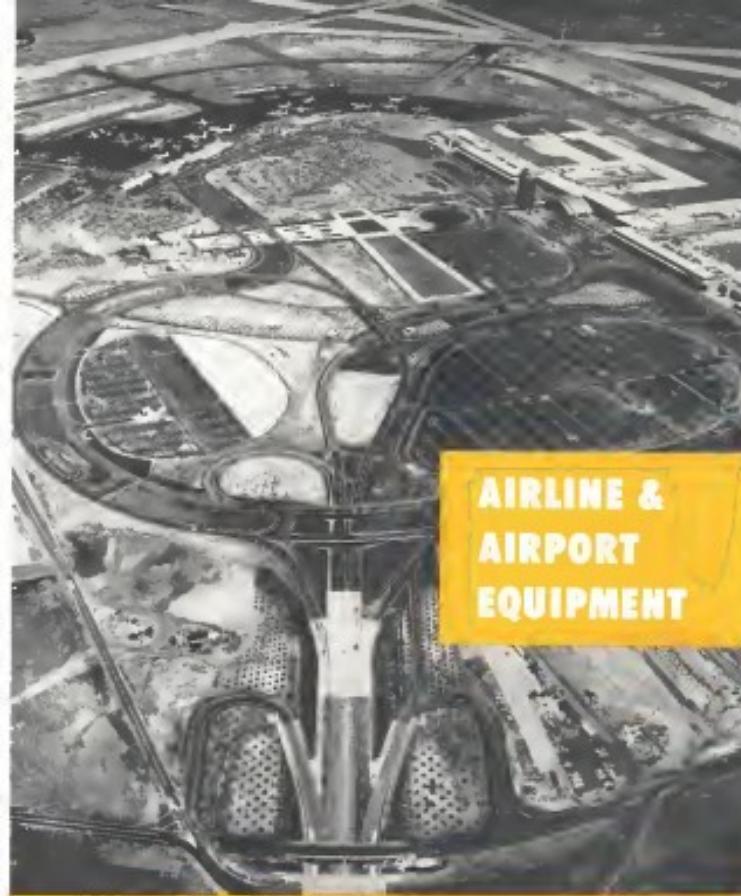
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第六章 二戰時期——新亞

# Jet Components Swell Airline Purchases

New York—Only major change in airline purchasing procedures during the last year is an increase in buying items never before in inventory.

Approaches adopted by the commercial airlines to the job of increasing in the purchasing departments of the world's airlines reflect an attitude the when Boeing 707s, Douglas DC-8s, and Convair 880s will start coming through their respective doors. Look back: Eastern, late model Vickers Viscounts, and British Britannias are also entering the purchasing picture.

## New Trends

To accommodate the gas turbine engine plants, new items never before known in airline inventories such as fuel-air starters, electric cabin air-dilution boosters, compressor bleed air systems, wing spoilers, and a host of other items, are appearing on airline purchase orders, and more will be moving into airline inventories.

Airline purchasing efforts are now oriented toward optimization. Two basic practices are responsible for purchasing

activities in our office of materials and major purchasing centers, each for specific categories of needs.

Example of the first system is Pan American World Airways' Service of Supply, headquartered at La Guardia Field, New York, which is the central purchasing office organization it is divided into seven commodity categories, whereas all warehouse activities are centralized under one roof, and all is directed into aircraft maintenance, engine, engine accessories, and propeller, radio, radar, and electrical ground and shop equipment; landing gear, cabin interior, painting, maintenance, and office equipment. Avcojet fuel and oil is a separate category handled by the Fuel Management Department.

Example of the second system is American Airlines' Tulsa Standard and Supply Depot which houses all equipment and supplies needed for the sleep, such as washrooms, tools, parts, paints, and liquids, all aircraft and passenger transport space and equipment required to keep AA's fleet serviceable and ready for the customer over land and above the clouds—designed small items that do not

allow to be bought separately.

American's LaGuardia supply office buys virtually everything the except

airlines need and would buy and sell.

## International Purchasing

Tony World Airlines' nation resembles Pan American's, except that TWA maintains an International Purchasing Office at O'Hare Field, Paris, which buys Europe-organized supplies.

United Air Lines, like American, has executive headquarters in Chicago and its main overhaul base is San Francisco, each with central purchasing responsibility.

Southern Airways follows the concentration system, concentrating all executive, aircraft, and maintenance, and purchasing activities in one location.

Fringes exists for the most part have purchasing offices in New York, though which has passenger aircraft and engine spares, where accessories, and maintenance for their U.S. aircraft. Some foreign lessors also maintain purchasing offices on the West Coast.

## AIR TRANSPORT ASSOCIATION PURCHASING COMMITTEE

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INSIDE RUSSIA—Bob Note on a balcony of the Hotel National in Moscow, while covering the 1996 USAF inspection trip to Russia. In the background you see the Kremlin. Since 1948 Bob has covered practically every national and international air show

... visited aircraft factories, research facilities and military installations throughout the United States, in NATO countries, South America and Asia. He has reported on all this and more in the pages of AVIATION WEEK.



# Smashing the Iron Curtain

*Bob Hutz, Editor of AVIATION WEEK, is first again with missile and aircraft data from behind the Iron Curtain.*

It was AVIATION WEEK, in the person of Editor Bob Hutz, that first reported to the Western World that the Soviets had fired the Intercontinental Ballistic Missile (ICBM) in the May 20, 1957 issue...first to report the firing of the Intermediate Ballistic Missile by the Soviets, too (Feb. 1956)...first to report that the Russians had long-range jet bombers.

In 1956, Bob covered the team of top-ranking U.S. Air Force Commanders on their official inspection trip to Russia. Here he met with the heads of the Russian Air Force, top aircraft designers, and the chiefs of Aeroflot (the Russian commercial airline). Again, AVIATION WEEK was first with the facts!

Born in Milwaukee, Bob started his writing career with the Milwaukee Journal after graduating from Northwestern in 1936. Taking up flying in 1939, he came to New York to head the Journal's news bureau in 1940.

In the fall of 1941, he began his Air Force service on the staff of General Henry Arnold...then to the Air Transport Command. Later, Bob served on the staff of General Claire L. Chennault in China, where he flew combat missions in B-25's.

After the war, Bob became news editor for AVIATION WEEK...covered the Korean war, in person...became editor of AVIATION WEEK in 1955. He has written, and still writes, outstanding books on aviation.

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